



Krybar®

In the next coming years, the demand of cleaner energy will continue to rise.

Natural Gas is an environmentally acceptable and efficient energy source to meet the growing demand. Export and import terminals with LNG tanks have to be built or extended for the development of the worldwide natural gas distribution.

ArcelorMittal provides a special developed concrete reinforcement bar for the construction of LNG tanks, as well as LPG and Ethyl tanks: Krybar®. Krybar® is a special concrete reinforcing steel designed on demands of the LNG industry in order to provide safety for cryogenic applications.

Due to its special composition and rolling process, Krybar® has a high ductility even at very low temperatures, down to -170°C (240°F).

ArcelorMittal offers a wide range of Krybar® Grades depending on the design temperature of the tank:

- Krybar®50 for LPG tanks with temperatures down to -50°C
- Krybar®105 for Ethyl tanks with temperatures down to -105°C
- Krybar®620 & Krybar®165 for LNG tanks with temperatures down to -170°C

ArcelorMittal has been producing

Krybar® since 1980 and Krybar® has been used in more than 250 tanks worldwide. Today, Krybar® is produced in the new rolling mill of ArcelorMittal Warszawa.

ArcelorMittal Warszawa is a reputed producer of carbon and special steel long products, equipped with state of the art production facilities and certified according to ISO 9001 & ISO TS 16949 (Quality Assurance) and 14001 standards (Environmental Management). The site Quality Assurance System is the guarantee for continuous high quality standards and products.

High Quality Standard

Specifications — Ambient Temperature

Krybar® fulfills the EN10080 at ambient temperature:

Re min	500 MPa
Rm min	550 MPa
Rm/Re min	1,08
Agt min	5%

Extract of Reference List

Europe: Fos-Cavaou, Dunkerque (France), South Hook LNG, Dragon LNG-Milford Haven, Isle of Grain, Moss - Morran (United Kingdom), Barcelona, Murgados, Sagunto, Huelva, Cartagena, Bilbao, Gijón (Spain), Snohvit, Risavika (Norway), Nynäshamn, Lsyekil (Sweden), La Spezia (Italy), Revithoussa (Greece), Sines (Portugal); Pori LNG (Finland); Grangemouth Ethane (UK)

Asia: RasGas LNG, Qatar I+II, QAPCO (Qatar), FEUPY, Yizheng - Yudong LNG - Guandong Dapeng LNG - Binhai LNG - Jiangsu, Dalian, Dapeng LNG - Guangdong, Putian LNG - Fujian, Yangshan LNG - Shanghai, Ningbo LNG - Zhejiang, Ningxia, Zhuhai LNG - Guangdong, Hainan LNG - Hainan (China), Incheon (South Korea), Sakhalin (Russia), Kochi, Hazira, Dahej, Dabhol, Gujarat (India), Abu Dhabi, Das Island ADGAS LNG, Oman (United Arab Emirates), Bintulu (Malaysia), Lumut (Brunei), BLNG Brunei, PTT LNG (Thailand), Yemen LNG (Yemen), Singapore LNG (Singapore), Sadara (Saudi Arabia); Wuhaogou, Shanghai (China); LNG Bintulu Sarawak (Malaysia); Shenzhen LNG Peak Shaving (China)

America: Cameron, Yankee Gas, Freeport, Cheniere Sabine Pass, Gulf LNG (United States), Atlantic LNG (Trinidad and Tobago), Altamira, Costa Azul, Manzanillo (Mexico), Guayanilla Bay (Puerto Rico), Peru LNG (Peru), Quintero LNG (Chile), Canaport LNG (Canada); Tilbury Expansion, BC (Canada)

Africa: Skikda LNG (Algeria), ELNG Idku, Damietta (Egypt), Bonny Island (Nigeria), Angola LNG (Angola)

Australia: Darwin, Pluto LNG, QCLNG - Queensland Curtis LNG, GLNG Gladstone LNG, Wheatstone, Onslow



Specifications —Design Temperature

For qualifying concrete reinforcing steel at cryogenic temperature, following criteria are used:

	BS 7777	Krybar® 165	EN14620	Krybar® 620
Uniform Elongation – Agt on Un-Notched bar	Min. 3%	Min. 3%	Min. 3%	Min. 3%
Yield Strength on Un-Notched bar	No requirement	Min. 1,15 x Design YS	Min. 1,15 x Design YS	Min. 1,15 x Design YS
Uniform Elongation – Agt on Notched Bar	Min. 1%	Min. 1%	No requirement	/
NSR= $\frac{\text{Tensile strength of the notched bars}}{\text{Lower yield strength of unnotched bars}}$	≥1	>1	≥1	≥1

Material test certificate 3.1 will be issued for each heat delivered, low temperature tests are included.
On request: material test certificate 3.2 or Third Party Inspection.

Service

Krybar® has been field approved in the construction of more than 250 tanks worldwide in the past 35 years and it has become the international product reference.

Available diameters: 12, 16, 20, 25, 28 & 32 mm
Various lengths based on project specification



Energy Projects HQ

Mannesmannweg 5
4794 SL Heijningen
The Netherlands
T +31 88 0083 700
projects.europe@arcelormittal.com